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Effect of Exercise on Health and Performance by Long-Haul, High-Stress Steers During the Receiving Period

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Abstract

Morbidity and mortality associated with the bovine respiratory disease (BRD) complex continue to be a significant challenge to the United States beef industry. Stress associated with maternal separation, environment change, transportation, diet changes, and commingling are common to beef industry marketing channels and have been linked to depressed growth and health of recently weaned calves. Cattle originating from the Southeastern U.S. tend to exhibit high rates of BRD after transportation to Great Plains feedlots.

Previous research has utilized exercise one time per day or three times per week for the receiving period. In those studies, health performance of cattle was not different from non-exercised cattle and differences in gain performance were minimal. The objective of this research was to examine the effect of exercise four times daily for the first 14 days after arrival on incidence of BRD and animal growth and performance.

Keywords

high-stress steers, bovine respiratory disease, exercise, morbidity, mortality

Authors

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Introduction

Morbidity and mortality associated with the bovine respiratory disease (BRD) complex continue to be a significant challenge to the United States beef industry. Stress associated with maternal separation, environment change, transportation, diet changes, and commingling are common to beef industry marketing channels and have been linked to depressed growth and health of recently weaned calves. Cattle originating from the Southeastern U.S. tend to exhibit high rates of BRD after transportation to Great Plains feedlots.

Previous research has utilized exercise one time per day or three times per week for the receiving period. In those studies, health performance of cattle was not different from non-exercised cattle and differences in gain performance were minimal. The objective of this research was to examine the effect of exercise four times daily for the first 14 days after arrival on incidence of BRD and animal growth and performance.

Experimental Procedures

Receiving protocol and treatments: 275 crossbred steers (average purchase weight = 496 lb) were purchased through an order buyer from multiple sale barns in Mississippi and Alabama and were transported (approximately 17 hours) to the Kansas State University Agricultural Research Center Feedlot in Hays, KS (KSU-ARCH). Upon arrival, cattle were individually tagged and weighed. Cattle were penned by truck and allowed free choice access to water and grass hay (13.7% CP, 13.7% ADF; DM basis). Cattle were stratified by truck and arrival weight, and assigned randomly to 1 of 2 receiving treatments with 5 pen replicates per treatment (10 pens, 27 or 28 head per pen). Treatments: 1) Steers were fed the facility's standard receiving ration and observed twice daily for symptoms of BRD (CON); 2) Steers were fed the facility's standard receiving ration, observed twice daily for symptoms of BRD, and exercised within their pen for 20 minutes every 6 hours for the first 14 days of the 60 d receiving period (EX).

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Processing and management: At processing, cattle were weighed, vaccinated for clostridial disease (Ultrabac 7, Zoetis, Parsippany, NJ), respiratory disease (Bovi-Shield Gold, Zoetis, Parsippany, NJ), and administered an anti-microbial (Zuprevo, Merck, Madison, NJ). Steers also received a growth promoting implant (Component, Elanco Animal Health, Greenfield, IN). Steers were maintained in 11,120 ft^2 earth-floor pens with 9.5 inches of linear bunk space per head for the duration of the study. Cattle were fed once daily, using a slick-bunk management method and feed calls were made each morning at 0700 before feed delivery. Cattle were evaluated twice daily for 21 d and daily thereafter by KSU-ARCH feedlot personnel for clinical signs of morbidity. Cattle exhibiting clinical signs of morbidity were removed from their home pen for treatment and immediately returned. Medical treatments were administered according to the normal protocol for this facility (Table 1).

Data collection: Steers were individually weighed on d 0, 15, 29, and 57.

Results and Discussion

Exercise had no effect on body weight or average daily gain (ADG) compared to control steers during the receiving period (Table 2). Although not statistically different, numerically, there were 7.7% more CON steers treated for BRD by day 14, compared to EX steers (Table 3). Likewise, numerically there was a 2.67% greater death loss for CON by day 14 compared to EX steers (Table 3). By day 28 of the receiving period, the death loss difference was 2.10% greater for CON steers than for EX steers. Although not statistically different, economically (purchase price of $814.68/head) this equates to $4,704.78 greater loss for CON-treated steers than for EX-treated steers.

Bovine respiratory disease complex treatment cost was greater for EX steers on day 14 than for CON steers (Table 4). During this period, numerically more EX steers were treated twice for BRD than were CON steers (Table 3). However, death loss (and associated economic loss) was greater for CON steers than the increase in drug treatment cost for EX steers. It is likely that exercise of steers (20 minutes every 6 hours) allowed more mildly moribund steers to be identified and retreated than for CON steers.

Average dry matter (DM) delivered daily to EX and CON steers was not different during any period throughout the 57-day study (Table 5). However, DM intake/hd/d was greater for CON steers for each period of the study (days 0–15, 16–29, and 30–57) compared to EX steers (Table 5). However, the EX steers were also more efficient (lb of feed/lb of gain, F:G) during the first 15 days with a F:G of 3.02 compared to the CON steers with a F:G of 3.36 (coinciding with the period they were exercised 4 times per day, Table 5). Likewise, although DM intake was lower for EX steers during the first (days 0–15) and second period (days 12–29), numerically, EX steers displayed a 0.2 lb/hd/d greater ADG than did CON steers but this was not statistically different. Numerically, total gain per treatment for each period was also greater for EX steers compared to CON steers (Table 5). Perhaps, exercise and encouraging steers to get up and move resulted in improved efficiency. Improved performance may be the result of earlier identification and treatment of moribund steers by prompt detection of steers requiring a second or third treatment for BRD. Other measures of efficiency (period gain and F:G) were not different between treatment groups for any other time point.

Implications

Although these data do not fully support frequent exercise of newly received long-haul, high-stress cattle, they do suggest that exercise can be utilized to reduce death loss and it may also improve feed efficiency and animal performance.

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Table 1. Treatment schedule used to treat steers diagnosed with bovine respiratory disease complex

Treatment	Drug	Dose	Route of injection	Hours to retreat
1st	Baytril 100 (enrofloxacin)	5 mL/cwt	Subcutaneous	48
2nd	Nuflor (florfenicol)	3 mL/cwt	Intramuscular	48
3rd	LA300 (oxytetracycline)	3 mL/cwt	Subcutaneous	48

Table 2. Long-haul, high-stress steer body weight and average daily gain during the receiving period for steers exposed to normal management or exercise for 14 days

	Management treatment		
Variable	Control	Exercise*	*P*-value
Steer body weight, lb			
Day 0	497	495	0.96
Day 15	535	535	0.98
Day 29	580	583	0.98
Day 57	681	688	0.99
Average daily gain, lb			
Days 0–15	2.46	2.61	0.65
Days 16–29	3.21	3.44	0.36
Days 20–57	3.56	3.57	0.92

*Steers were exercised within their pen for 20 minutes every 6 hours for the first 14 days after receiving.

Table 3. Proportion of long-haul, high-stress steers exhibiting and treated for bovine respiratory disease, number of times treated for bovine respiratory disease, and associated death loss during the receiving period of those exposed to normal management or exercise for 14 days

	Management treatment		
Variable	Control	Exercise*	*P*-value
Pulled and treated, %			
Day 7	0.73	2.19	0.33
Day 14	9.18	1.43	0.23
Day 21	16.67	16.79	0.98
Day 28	17.39	16.79	0.89
Day 35	21.26	19.91	0.82
Pull rate, %			
Treated 1 time	2.13	1.99	0.82
Treated 2 times	7.25	8.03	0.81
Treated 3 times	0.72	1.46	0.57
Death loss, %			
Day 14	6.78	4.11	0.37
Day 21	6.78	4.11	0.37
Day 28	7.13	5.03	0.48
Day 60	7.97	6.57	0.66

*Steers were exercised within their pen for 20 minutes every 6 hours for the first 14 days after receiving.

Table 4. Treatment costs for long-haul, high-stress steers exhibiting and treated for bovine respiratory disease during the receiving period and exposed to normal management or exercise for 14 days

	Management treatment		
Drug treatment cost/head, $	Control	Exercise*	*P*-value
Day 7	0.13	0.38	0.31
Day 14	1.62	2.93	0.09
Day 21	3.44	4.02	0.59
Day 28	3.67	4.02	0.75
Day 35	4.74	4.65	0.94

*Steers were exercised within their pen for 20 minutes every 6 hours for the first 14 days after receiving.

Table 5. Dry matter pounds delivered, DM intake (lb/hd), treatment group gain, and feed:gain for each period and the entire study

	Management treatment		
Variable	Control	Exercise*	*P*-value
Days 0–15			
DM delivered, lb	3094	3066	0.76
DM intake, lb/hd/day	8.30	7.53	0.08
Total gain, lb	926.8	1026.8	0.18
Feed:Gain	3.36	3.02	0.08
Days 16–29			
DM delivered, lb	4562	4714	0.45
DM intake, lb/hd/day	14.0	12.9	0.04
Total gain, lb	1123.6	1250.4	0.45
Feed:Gain	4.19	3.88	0.52
Days 30–57			
DM delivered, lb	10774	11357	0.17
DM intake, lb/hd/day	16.7	15.8	0.02
Total gain, lb	2470.8	2560.4	0.51
Feed:Gain	4.37	4.47	0.57
Days 0–57			
DM delivered, lb	18377	19138	0.24
DM intake, lb/hd/day	13.8	12.9	<0.01
Total gain, lb	4548.4	4873.6	0.15
Feed:Gain	4.05	3.98	0.24

*Steers were exercised within their pen for 20 minutes every 6 hours for the first 14 days after receiving.